NAME _____ DATE _____ PERIOD _____

1-6 Commutative and Associative Properties

(Pages 32–36)

You can use the Commutative and Associative Properties with other properties you have studied to evaluate or simplify expressions.

Commutative Property	The Commutative Property says that the order in which you add or multiply two numbers does not change their sum or product. For any numbers a and b, $a + b = b + a$ and $a \cdot b = b \cdot a$.
Associative Property	The Associative Property says that the way you group three numbers when you add or multiply them does not change their sum or product. For any numbers a, b, and c, $(a + b) + c = a + (b + c)$ and $(ab)c = a(bc)$.

Examples **Simplify.**

a. $2x^2 + 7x + 5x^2$

$2x^2 + 7x + 5x^2$
$= 2x^2 + 5x^2 + 7x$ *Commutative (+)*
$= (2 + 5)x^2 + 7x$ *Distributive Property*
$= 7x^2 + 7x$ *Simplify.*

b. 642×7

642×7
$= (600 + 40 + 2)7$ *Substitution (=)*
$= 4200 + 280 + 14$ *Distributive Property*
$= 4494$ *Add.*

Practice

Name the property illustrated by each statement.

1. $3 + 4 = 4 + 3$

2. $2 \cdot 9 = 9 \cdot 2$

3. $xy = yx$

4. $g + h + 2 = g + 2 + h$

5. $(2 + 5) + 7 = 2 + (5 + 7)$

6. $(6 \cdot 5)x = 6(5x)$

7. $7 + m = m + 7$

8. $3(4 \cdot 5) = (4 \cdot 5)3$

9. $ab + c = c + ab$

Simplify.

10. $3x + 2y + x$

11. $7a + 3n + 3a$

12. $8d + 2c + 2d + c$

13. $3m^4 + m^2 + 2m^4$

14. $10b^2 + 10b + 10b^2$

15. $\frac{1}{4}d + \frac{2}{3}g + \frac{1}{4}d$

16. $2(4x + y) - 3x$

17. $9 + 3(pq - 2) + pq$

18. $1.8(a + b) + 2.1(1 + a)$

19. Write an algebraic expression for the verbal expression "six times the sum of g and a increased by $3g$." Then simplify, indicating the properties used.

20. **Standardized Test Practice** Name the property or properties illustrated by the statement $s + t = t + s$.

A Associative only
B Commutative only
C Associative and Commutative
D neither Associative nor Commutative

Answers: **1.** commutative (+) **2.** commutative (×) **3.** commutative (×) **4.** commutative (+) **5.** associative (+) **6.** associative (×) **7.** commutative (+) **8.** commutative (×) **9.** commutative (+) **10.** $4x + 2y$ **11.** $10a + 3n$ **12.** $10d + 3c$ **13.** $5m^4 + m^2$ **14.** $20b^2 + 10b$ **15.** $\frac{1}{2}d + \frac{2}{3}g$ **16.** $5x + 2y$ **17.** $4pq + 3$ **18.** $3.9a + 1.8b + 2.1$ **19.** See Answer Key. **20.** B